ALGEBRA II SHOULD BE FUN, TOO

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Remember as a child learning long division and how much more fun it was when there was no remainder?

As Algebra teachers we have found how much more students enjoy learning a new concept if, for example, they can initially work with finding the square roots of perfect squares.

The following formula was developed to make learning the 3-dimensional distance formula easier and more fun for the Algebra II student.

$$a^2 + (a + 1)^2 + [a(a + 1)]^2 = [a(a + 1) + 1]^2$$

As you can see, this formula will give you three numbers which, when squared and then added together, will always yield a perfect square, thus making the square root easier and more fun to obtain.

To use this formula we begin by selecting a value, any number, for "a". Suppose we let $a = 3$. It would follow that $a+1 = 4$ and $a(a + 1) = 12$.

The distance formula may be expressed as:

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$$

Though there are many possible arrangements, for this problem we will let the differences be represented as follows:

$$\begin{aligned} a &= (x_2 - x_1) = 3 \\ a + 1 &= (y_2 - y_1) = 4 \\ a(a + 1) &= (z_2 - z_1) = 12 \end{aligned}$$

Now we will select coordinates; suppose we use (2, 4, –1) and (5, 8, 11). (Note: $5 - 2 = 3$, $8 - 4 = 4$, and $11 - (-1) = 12$.)

The students are told to find the distance between points A and B given the coordinates are A (2, 4, –1) and B (5, 8, 11).

They set up the formula, substitute, and solve as follows:

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$$

$$d = \sqrt{(5 - 2)^2 + (8 - 4)^2 + (11 + 1)^2}$$

$$d = \sqrt{3^2 + 4^2 + 12^2}$$

$$d = \sqrt{9 + 16 + 144}$$

$$d = \sqrt{169}$$

$$d = 13$$

Since the formula will work for any value of "a", the teacher may use any integral or fractional number. There is no limit to the quantity or kind of problems that can be presented to the student.

After you are satisfied that the student has mastered the new concept you can formulate problems that do not fit the a, a+1, a(a+1) format and be reasonably sure you will not get a perfect square.

As near as we can determine, this new formula in the form we have presented is unique. We have shared with you the reason why it was developed; to know how it was developed please feel free to contact me.

Don't Forget! The OCTM Annual Meeting in Zanesville, March 22–24, 1990.
